To be the most creative Lithium battery company, and make outstanding contributions to sustainable development.

EVE INR21700/40P Test Report

CONTENTS

1. Cell Specification

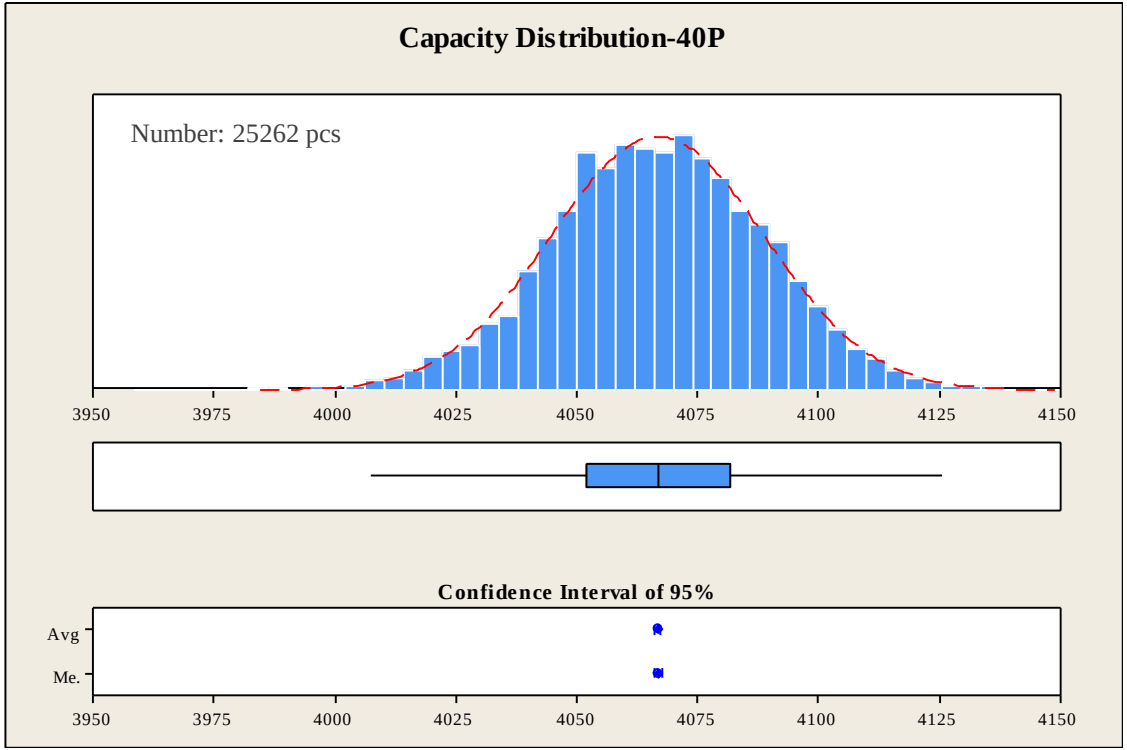
INR21700/40P	No.	Item		Specification
	1	Nominal Capacity	0.2C	4000mAh
	2	Nominal Energy	0.2C	14.4Wh
	3	Dimension	Diameter	21.15±0.10mm
	4		Height	70.15±0.15mm
	5	Weight		70.0g Max
	M	Operating Voltage Range		4.2V~2.5V
	7	Impedance	ACR	≤12mΩ
	8		DCR	≤20mΩ
	9	Charge Current	Standard	2.0A
	10		Max.	6A
	11	Discharge Current	Standard	0.8A
	12		Max.	50A
	13	Cycle life (RT, 4.2V~2.5V)		6A/30A 300th 60%
	14	Operation Temperature Range (Cell surface)	Charge	0~60℃
For reference only	15		Discharge	-20~80℃

2. Electrical Performance -- Summary

No.	Item		Unit	Spec	INR21700/40P(Batch LM)	Sample Size	Page
1	Capacity@0.2C		mAh	≥ 3950	4067.0	25262 pcs	4
2	Impedance	ACR	mΩ	≤ 12	9.1	25262 pcs	5
3		DCR	mΩ	≤ 20	13.0	5 pcs	6
4	Rate Discharge	0.8A	%	≥ 100	103.8	3 pcs	7
5		10A	%	100	100.0	3 pcs	7
6		20A	%	≥ 95	102.5	3 pcs	7
7		30A	%	≥ 93	101.8	3 pcs	7
8		40A	%	≥ 90	99.4	3 pcs	7
9	Different Temperature 10A Discharge	-20℃	%	≥ 60	89.3	3 pcs	8
10		-10℃	%	≥ 75	92.2	3 pcs	8
11		0℃	%	≥ 80	94.6	3 pcs	8
12		25℃	%	100	100.0	3 pcs	8
13		60℃	%	≥ 90	103.3	3 pcs	8
14	Cycle Life@25℃	(6A/10A)600th	%	≥ 60	87.5	3 pcs	9
15		(6A/20A)600th	%	≥ 60	82.6	3 pcs	11
16		(6A/30A)300th	%	≥ 60	82.6	3 pcs	13
17		(6A/40A)300th	%	≥ 60	85.8	3 pcs	15
18	Storage (60℃ 30D)	Cap. Retention	%	≥ 80	85.9	5 pcs	17
19		Cap. Recovery	%	≥ 90	96.9	5 pcs	17

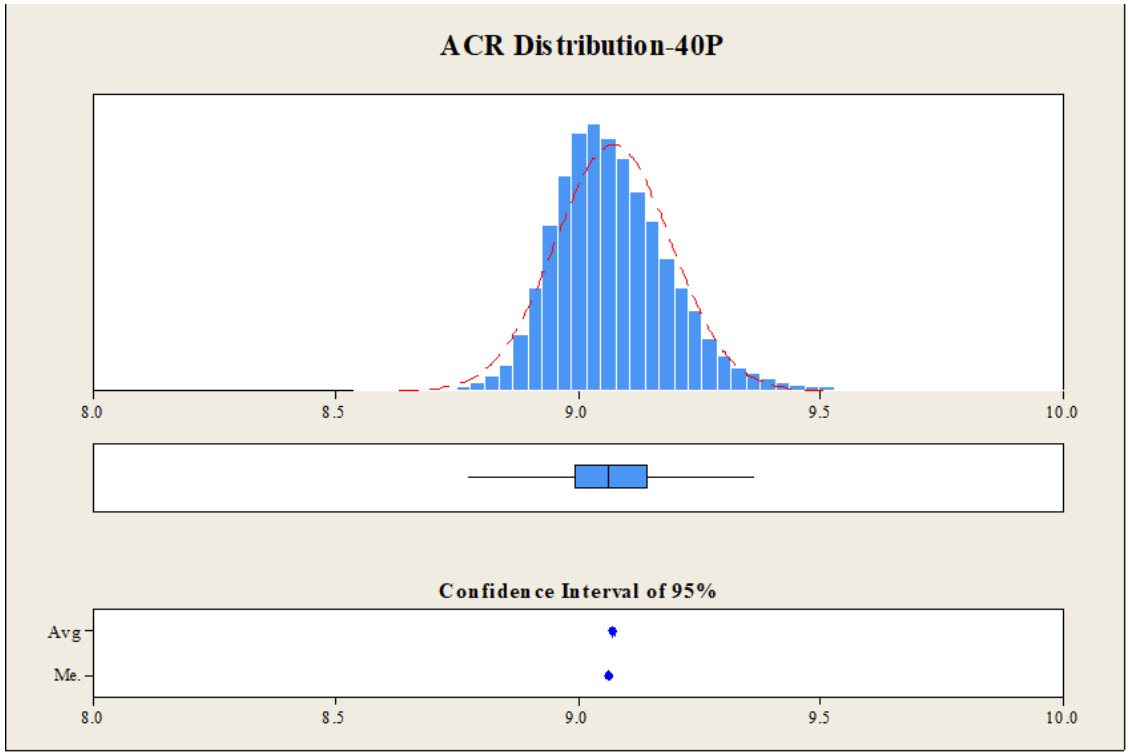
2. Electrical Performance – 0.2C Capacity

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=2A and CV=4.2V, 0.1A cut off. Rest for 10min.
- At 25±2℃, test capacity by 0.8A to 2.5V.



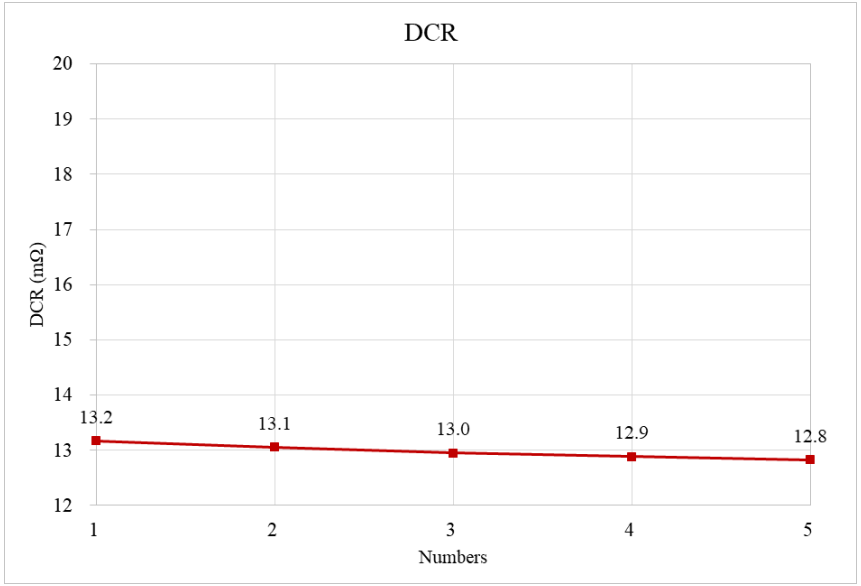
2. Electrical Performance -- ACR

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=2A and CV=3.5V, 0.1A cut off. Rest for 10min.
- At 25±2℃, test ACR by AC impedance at 1kHz .



2. Electrical Performance -- DCR

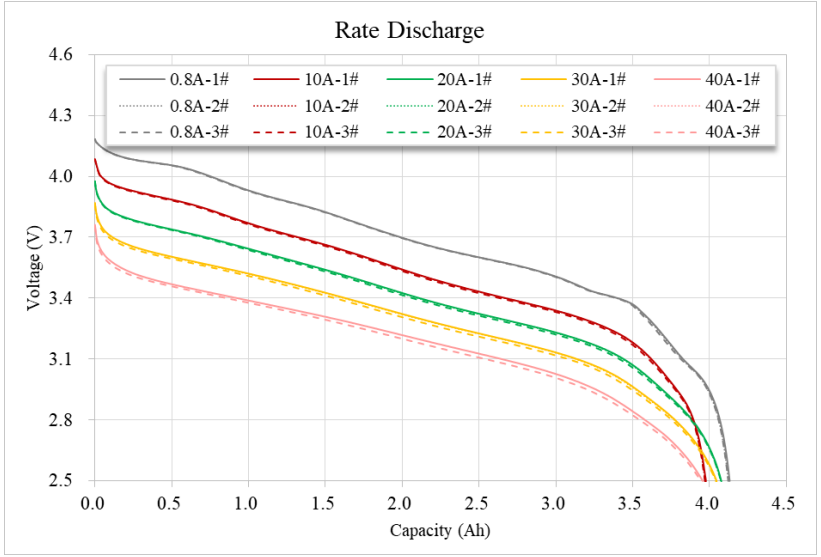
- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=3A and CV=4.2V, 0.05A cut off. Rest for 3h.
- At 25±2℃, test DCR by discharging 0.1A/10s-10A/1s-0.1A/10s-10A/1s-0.1A/10s-10A/1s.
- DCR=(V1-V2)/(I2-I1) → V1-32sec, V2-33sec, I1-32sec, I2-33sec.

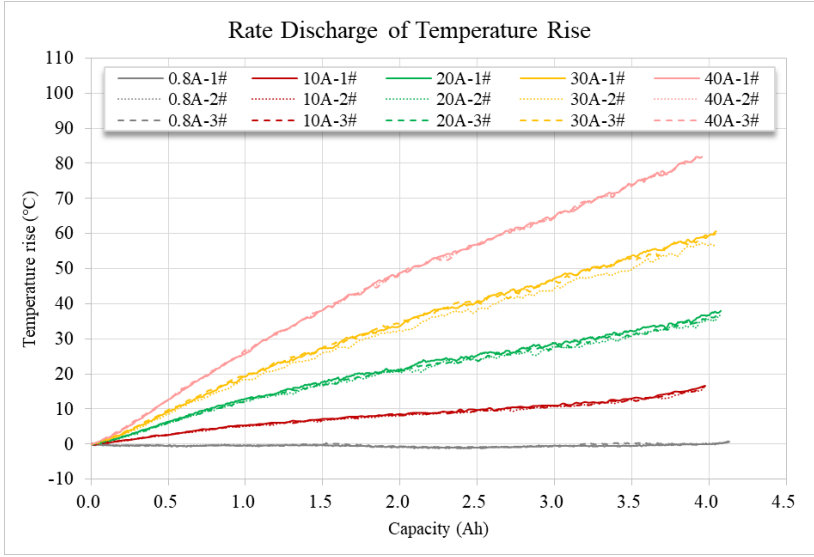


No.	40P
	100%SOC@RT
1	13.2
2	13.1
3	13.0
4	12.9
5	12.8
Avg.	13.0
Spec	≤ 20

2. Electrical Performance -- Rate Discharge

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- At 25±2℃, discharge by 0.8A/10A/20A/30A/40A to 2.5V. Rest for 30min.

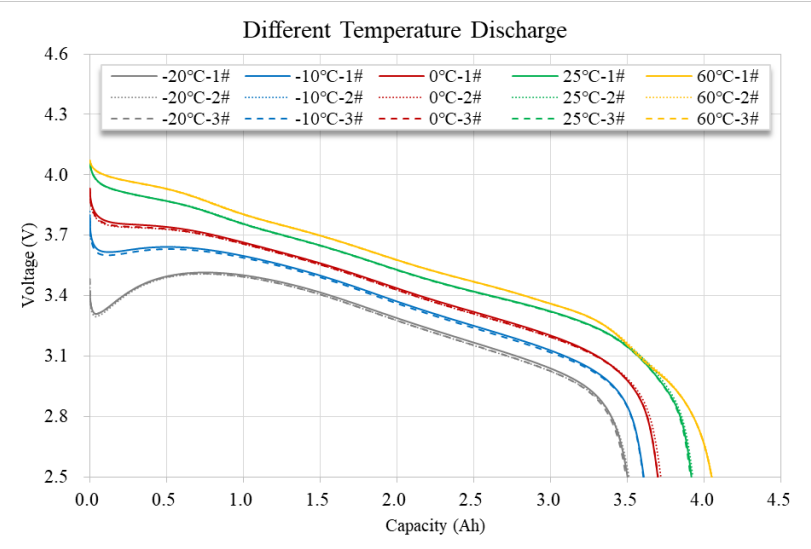




Capacity (%)	0.8A	10A	20A	30A	40A
1	103.8	100.0	102.5	101.8	99.5
2	103.8	100.0	102.5	101.8	99.5
3	103.8	100.0	102.6	101.8	99.3
Avg.	103.8	100.0	102.5	101.8	99.4
Spec	≥ 100	100	≥ 95	≥ 93	≥ 90

2. Electrical Performance -- Different Temperature 10A Discharge

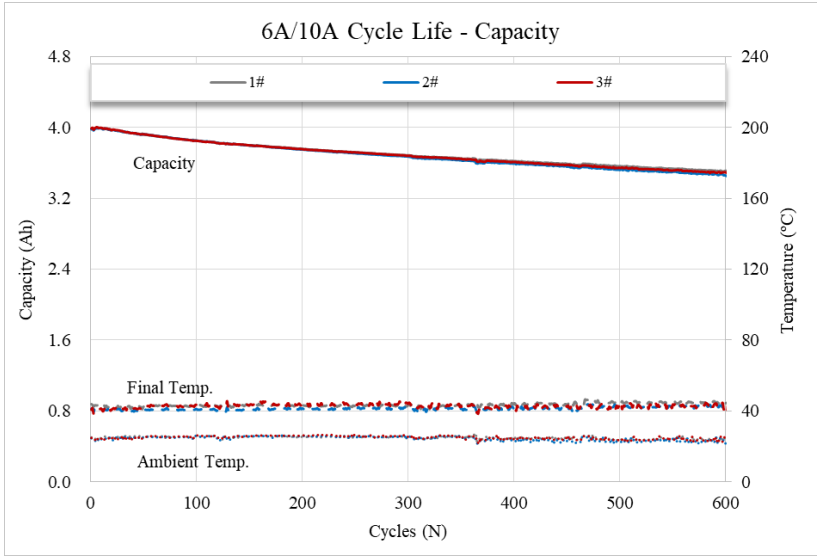
- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- At -20/-10/0/25/60±2℃ rest 3h, discharge by 10A to 2.5V.

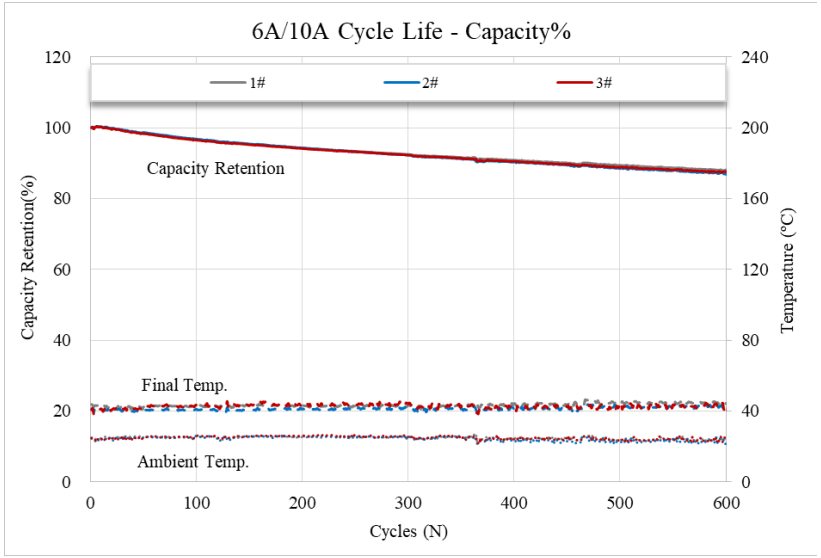


Capacity (%)	-20℃	-10℃	0℃	25℃	60℃
1	89.3	92.1	94.4	100.0	103.3
2	89.4	92.3	94.7	100.0	103.1
3	89.3	92.2	94.6	100.0	103.5
Avg.	89.3	92.2	94.6	100.0	103.3
Spec	≥ 60	≥ 75	≥ 80	100	≥ 90

2. Electrical Performance -- 6A/10A Cycle Life@25ºC

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- Discharge by CC=10A to 2.5V or 75ºC cut off. Rest for 30min. Cycle for 600 times.

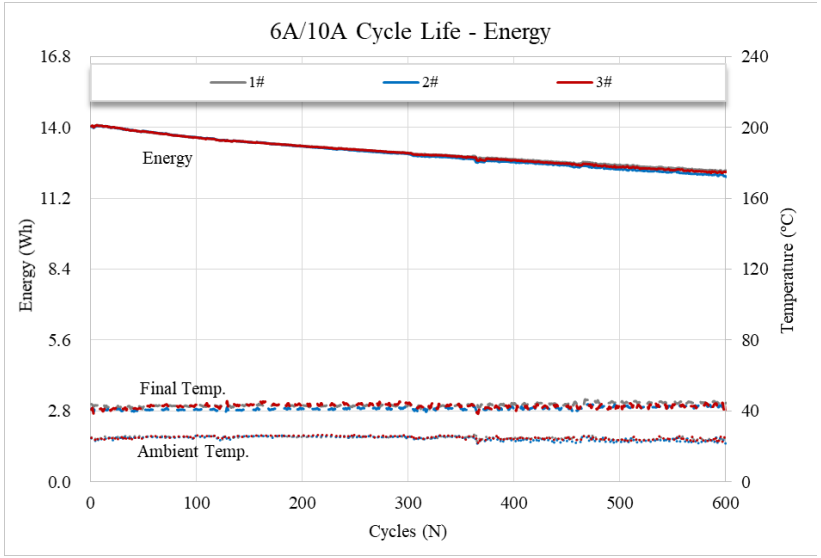


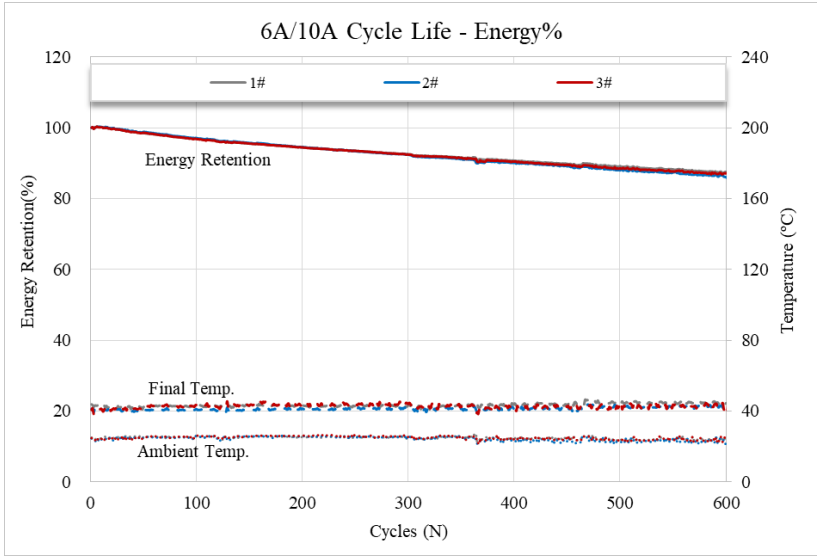


Capacity Retention (%)	1#	2#	3#	Avg.	Spec
600 cycles	88.1	86.9	87.6	87.5	≥ 60

2. Electrical Performance -- 6A/10A Cycle Life@25ºC

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- Discharge by CC=10A to 2.5V or 75ºC cut off. Rest for 30min. Cycle for 600 times.

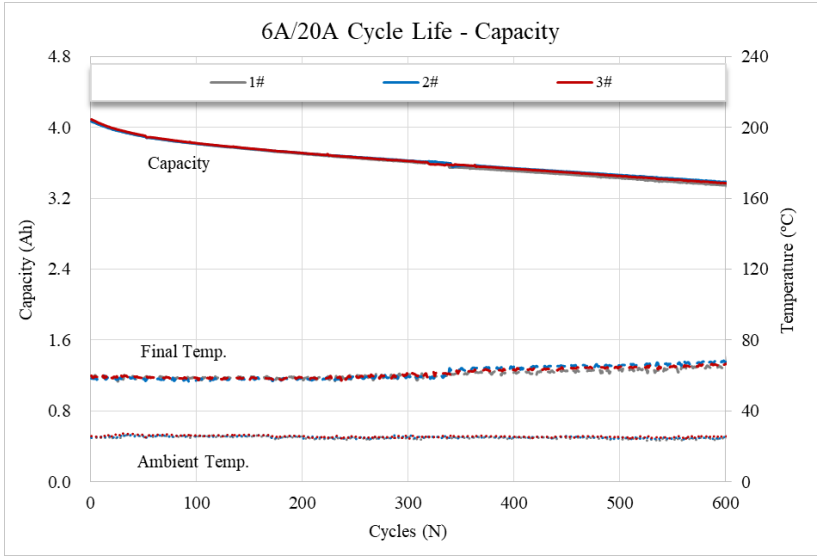


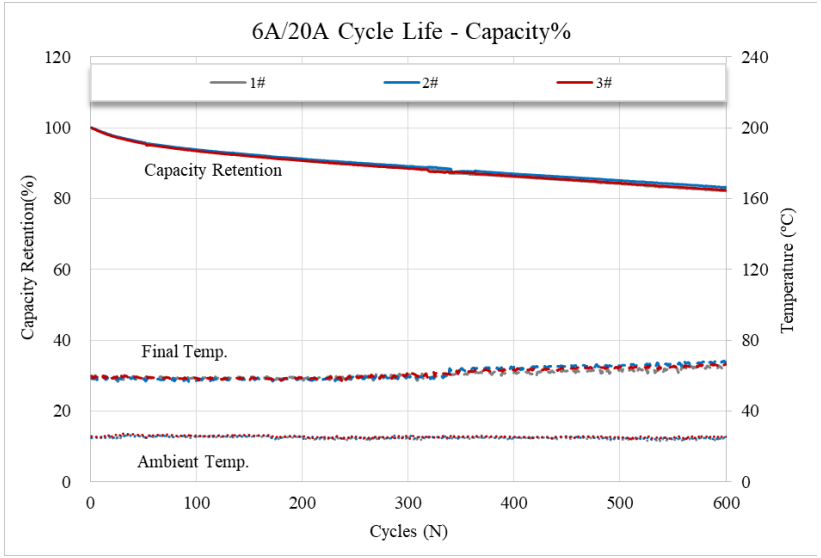


Energy Retention (%)	1#	2#	3#	Avg.	Spec
600 cycles	87.5	86.1	87.1	86.9	/

2. Electrical Performance -- 6A/20A Cycle Life@25ºC

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- Discharge by CC=20A to 2.5V or 75ºC cut off. Rest for 30min. Cycle for 600 times.

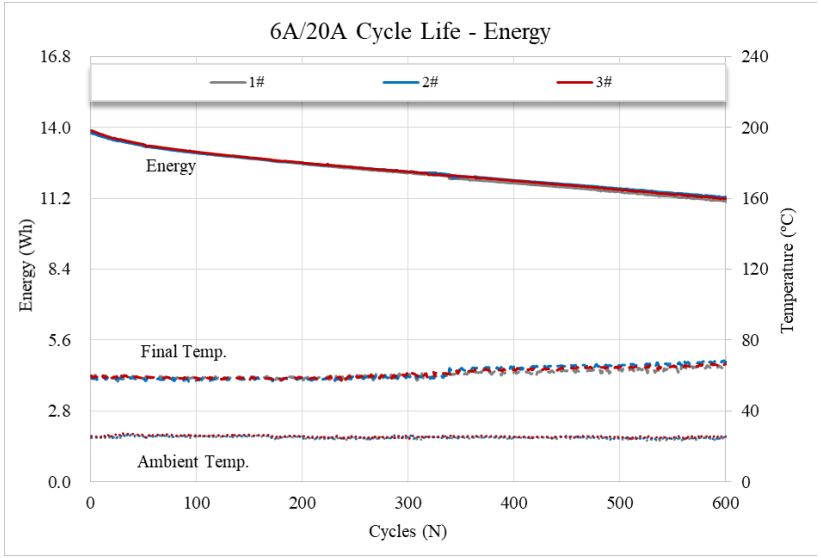


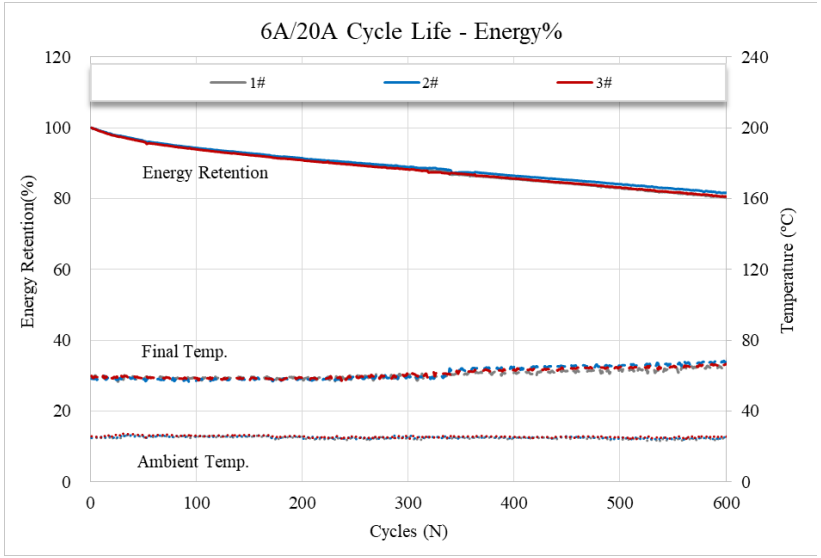


Capacity Retention (%)	1#	2#	3#	Avg.	Spec
600 cycles	82.2	83.2	82.4	82.6	≥ 60

2. Electrical Performance -- 6A/20A Cycle Life@25ºC

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- Discharge by CC=20A to 2.5V or 75ºC cut off. Rest for 30min. Cycle for 600 times.

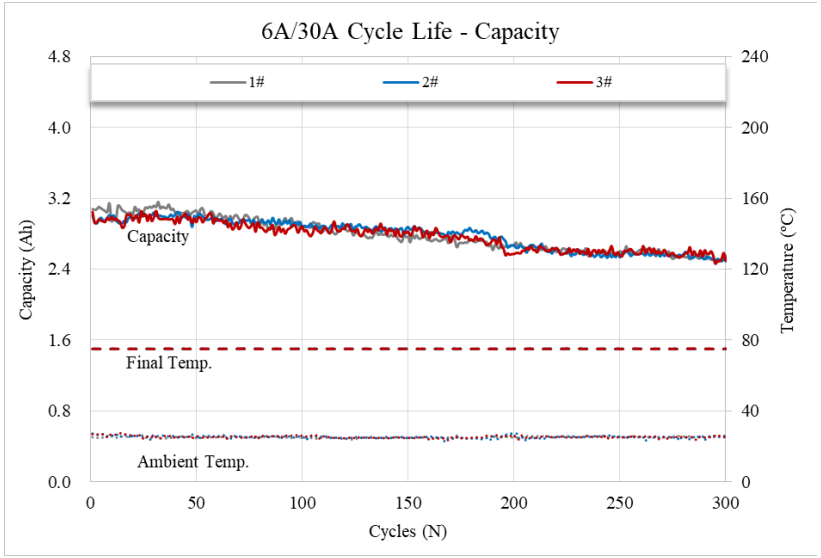


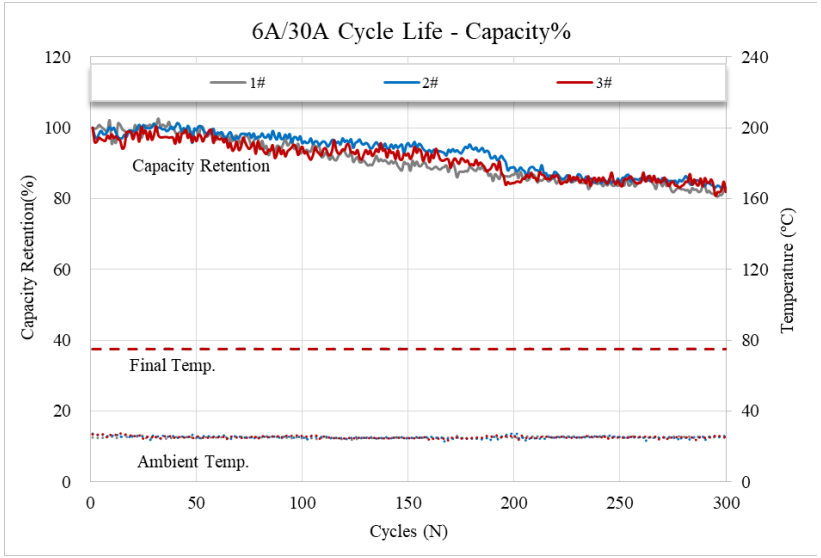


Energy Retention (%)	1#	2#	3#	Avg.	Spec
600 cycles	80.4	81.7	80.6	80.9	/

2. Electrical Performance -- 6A/30A Cycle Life@25ºC

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- Discharge by CC=30A to 2.5V or 75ºC cut off. Rest for 30min. Cycle for 300 times.

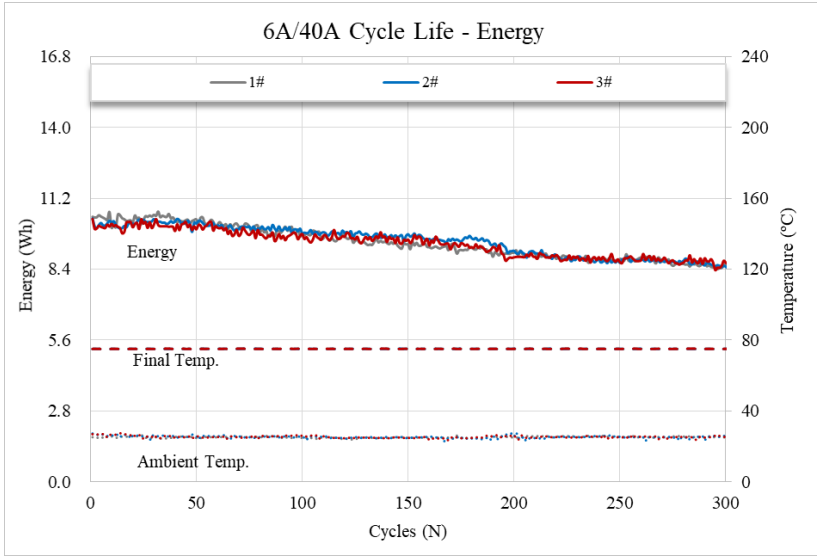


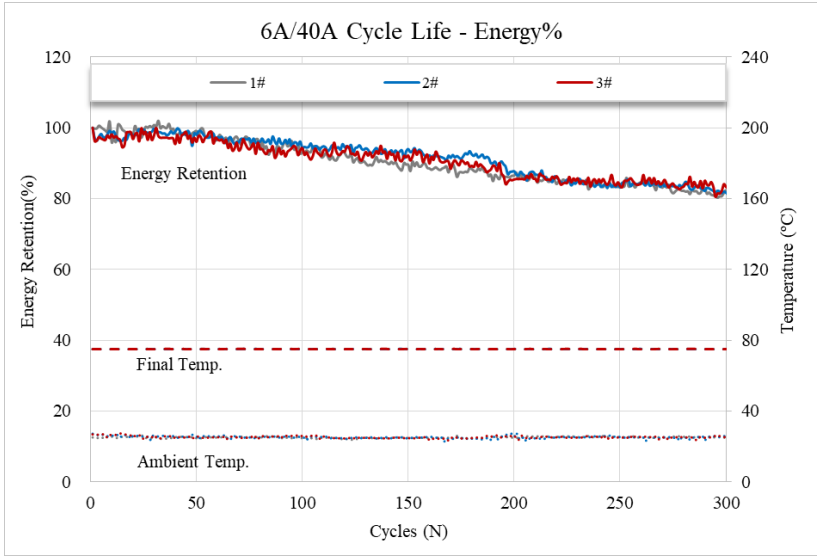


Capacity Retention (%)	1#	2#	3#	Avg.	Spec
300 cycles	83.0	83.0	81.9	82.6	≥ 60

2. Electrical Performance -- 6A/30A Cycle Life@25ºC

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- Discharge by CC=30A to 2.5V or 75ºC cut off. Rest for 30min. Cycle for 300 times.

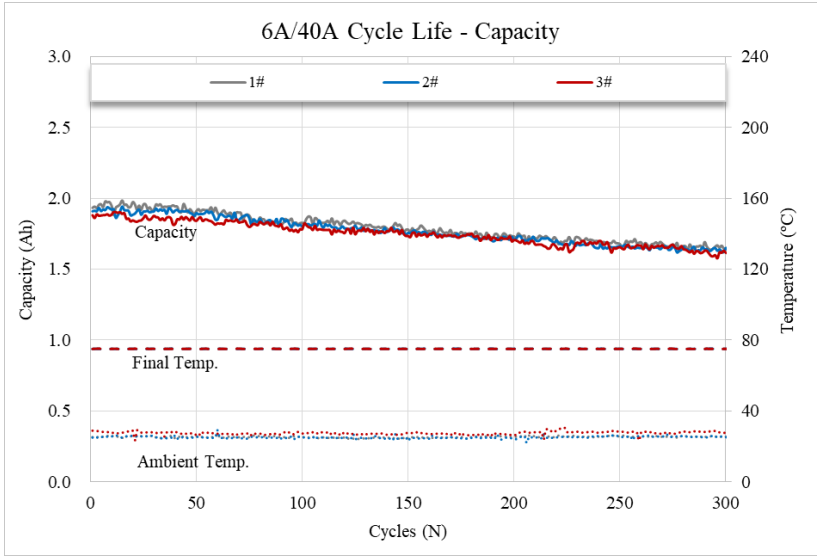


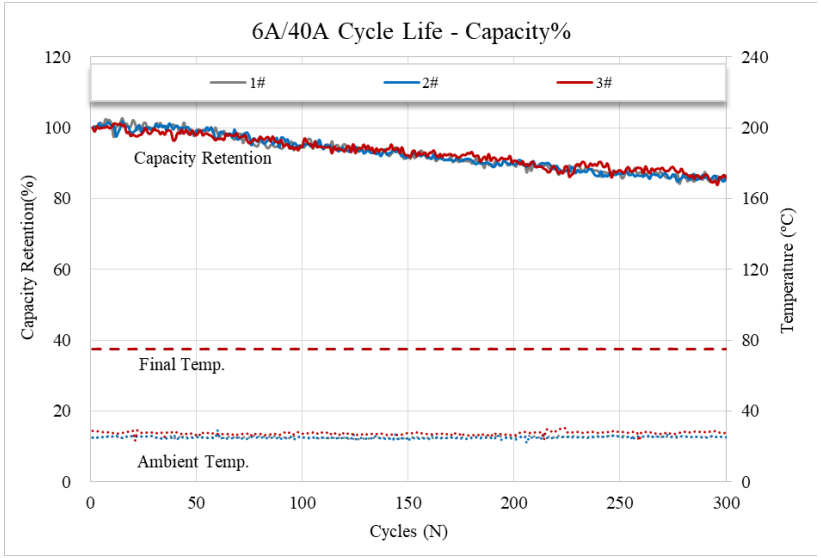


Energy Retention (%)	1#	2#	3#	Avg.	Spec
300 cycles	82.4	81.7	83.3	82.5	/

2. Electrical Performance -- 6A/40A Cycle Life@25ºC

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- Discharge by CC=40A to 2.5V or 75ºC cut off. Rest for 30min. Cycle for 300 times.

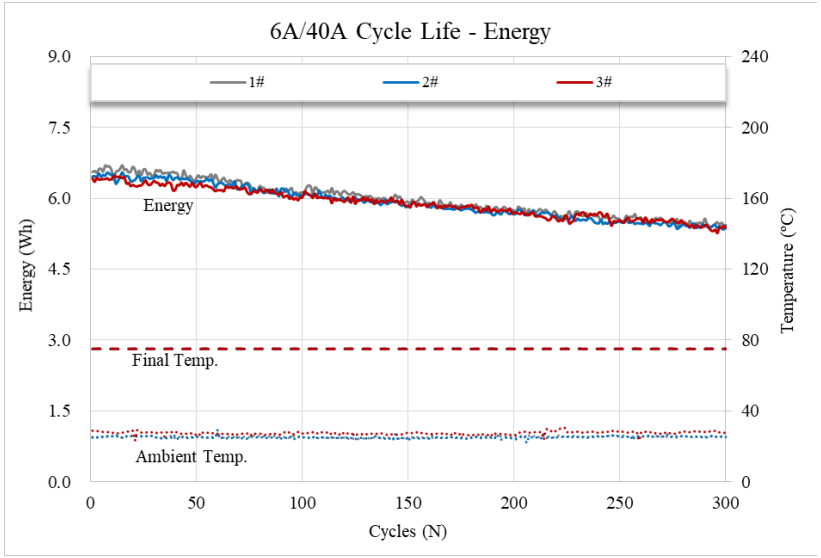


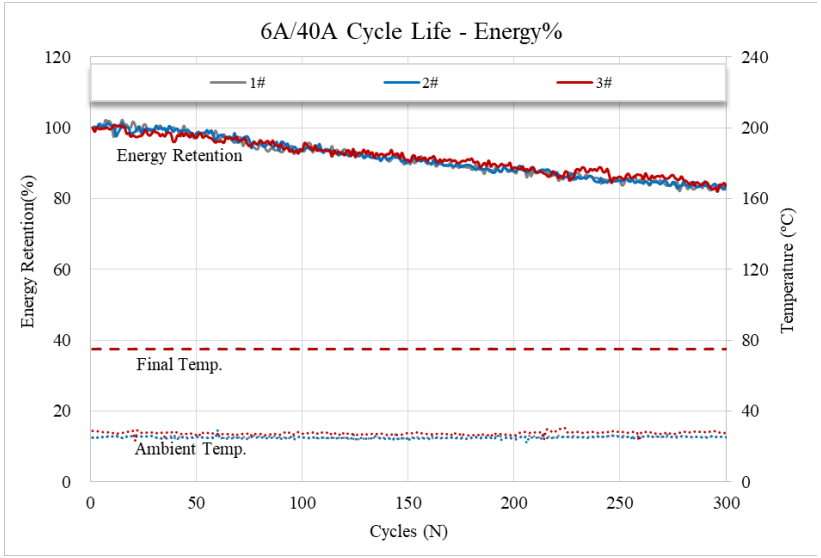


Capacity Retention (%)	1#	2#	3#	Avg.	Spec
300 cycles	85.1	86.4	86.0	85.8	≥ 60

2. Electrical Performance -- 6A/40A Cycle Life@25ºC

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then charge by CC=6A and CV=4.2V, 0.1A cut off. Rest for 10min.
- Discharge by CC=40A to 2.5V or 75ºC cut off. Rest for 30min. Cycle for 300 times.

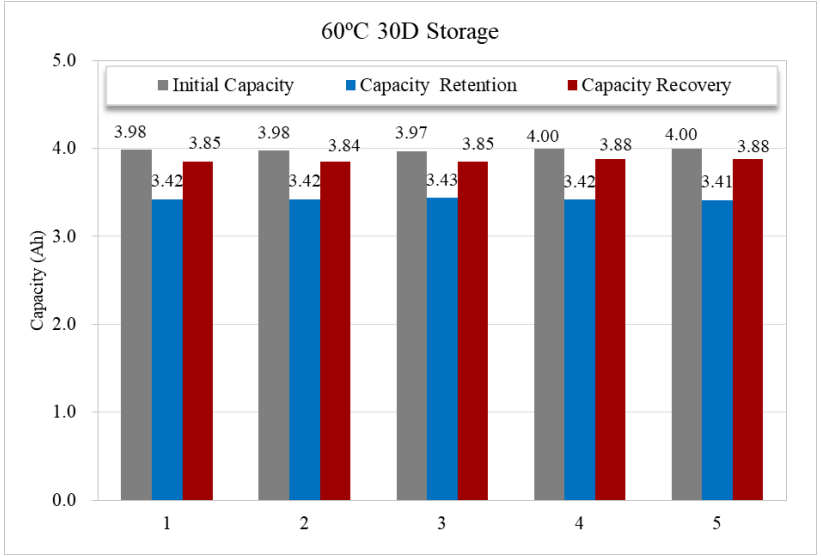


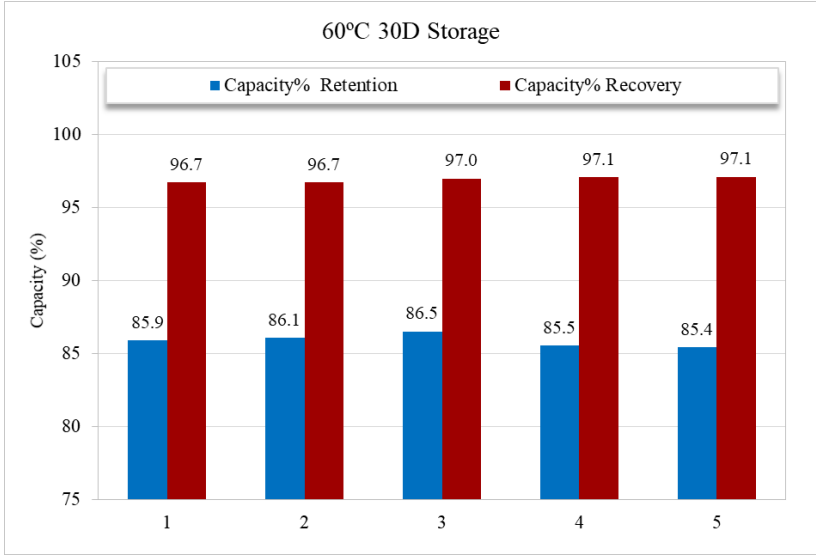


Capacity Retention (%)	1#	2#	3#	Avg.	Spec
300 cycles	82.7	84.0	83.7	83.5	/

2. Electrical Performance -- Storage

- At 25±2℃, discharge by CC=0.8A to 2.5V. Rest for 10min. Then Charge by CC=6A and CV=4.2V, 0.1A cut off. rest 10mins. Discharge by 10A to 2.5V, record initial capacity.
- Stored at 60±2℃ for 30 days, then discharge by 10A to 2.5V, record retention capacity, repeat step1 for 3 cycles and record recovery capacity.





Item	1#	2#	3#	4#	5#	Avg.	Spec
Capacity% Retention	85.9	86.1	86.5	85.5	85.4	85.9	≥ 80
Capacity% Recovery	96.7	96.7	97.0	97.1	97.1	96.9	≥ 90

3. Safety Performance -- Summary

No.	Item	Test Condition	Specification	Standard	Sample Size	Conclusion
1	Overcharge	12A charge to 8.4V	No fire, no explosion	UN38.3	3 pcs	Pass
2	External Short Circuit	80±20mΩ	No fire, no explosion	UL1642	3 pcs	Pass
3	Force Discharge	1C discharge 90min	No fire, no explosion, no leakage	IEC62133	3 pcs	Pass
4	Heating Test	130±2°C 10min	No fire, no explosion	UL1642	3 pcs	Pass
5	Low Pressure Test	11.6kPa 6hours	< 10%OCV drop	UN38.3	3 pcs	Pass
6	Drop Test	1.0m drop	No fire, no explosion	IEC62133	3 pcs	Pass
7	Vibration Test	7Hz→200Hz→7Hz 15min 12times	No fire, no explosion, no leakage；< 10%OCV drop	UN38.3	3 pcs	Pass

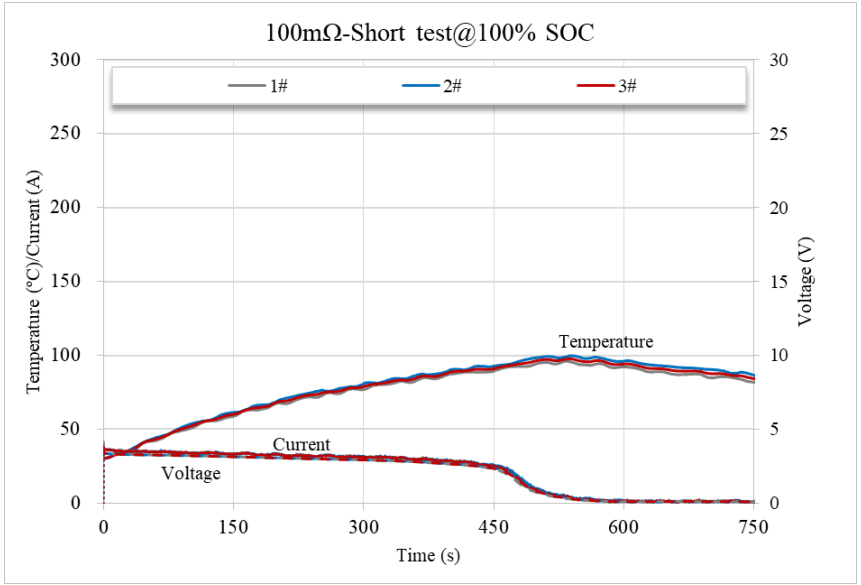
3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 100/80/60/40/20/10/5mΩ at RT.
- No fire and no explosion.

Resistance (mΩ)	No.	Before Test		After Test								Result
		ACIR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Current (A)	Max. Temp. (°C)	Al Tab Melt	CID Open	Vent Open	Fire	Explosion	
100mΩ	1#	8.7	4.186	551	37	96	No	No	No	No	No	Pass
	2#	8.7	4.186	551	37	99	No	No	No	No	No	Pass
	3#	9.0	4.185	553	37	98	No	No	No	No	No	Pass
80mΩ	1#	8.8	4.189	467	45	116	No	Yes	No	No	No	Pass
	2#	8.8	4.185	467	45	114	No	Yes	No	No	No	Pass
	3#	9.0	4.189	475	45	116	No	Yes	No	No	No	Pass
60mΩ	1#	8.8	4.182	306	55	130	No	Yes	No	No	No	Pass
	2#	8.8	4.187	310	54	130	No	Yes	No	No	No	Pass
	3#	8.9	4.185	310	54	130	No	Yes	No	No	No	Pass
40mΩ	1#	8.9	4.182	116	75	128	No	Yes	No	No	No	Pass
	2#	9.0	4.184	116	76	127	No	Yes	No	No	No	Pass
	3#	9.1	4.187	116	75	127	No	Yes	No	No	No	Pass
20mΩ	1#	9.0	4.183	27	122	93	Yes	No	No	No	No	Pass
	2#	8.8	4.189	26	123	93	Yes	No	No	No	No	Pass
	3#	9.1	4.188	26	122	93	Yes	No	No	No	No	Pass
10mΩ	1#	8.9	4.185	4	180	50	Yes	No	No	No	No	Pass
	2#	8.7	4.183	5	187	55	Yes	No	No	No	No	Pass
	3#	8.8	4.186	5	184	52	Yes	No	No	No	No	Pass
5mΩ	1#	8.8	4.186	2	223	43	Yes	No	No	No	No	Pass
	2#	8.8	4.183	2	227	43	Yes	No	No	No	No	Pass
	3#	8.9	4.185	2	224	43	Yes	No	No	No	No	Pass

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 100mΩ at RT.
- No fire and no explosion.

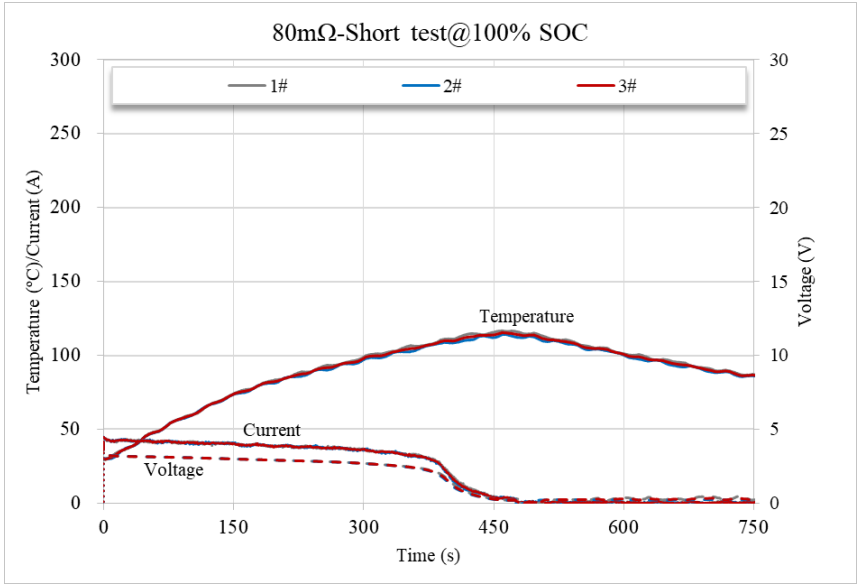


No.	Before		After			
	ACIR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (℃)	CID Open	Vent Open
1#	8.7	4.186	551	96	No	No
2#	8.7	4.186	551	99	No	No
3#	9.0	4.185	553	98	No	No

	Before	After
Picture		

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 80mΩ at RT.
- No fire and no explosion.

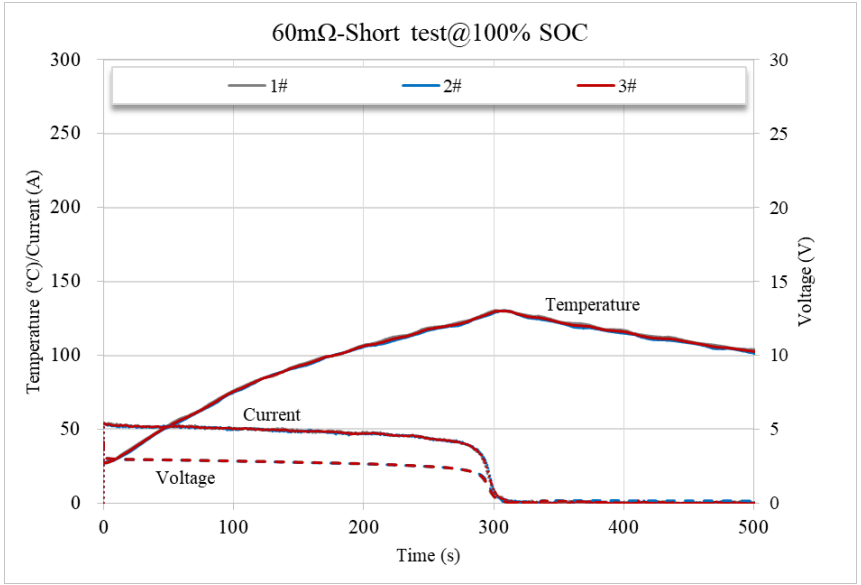


No.	Before		After			
	ACIR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (℃)	CID Open	Vent Open
1#	8.8	4.189	467	116	Yes	No
2#	8.8	4.185	467	114	Yes	No
3#	9.0	4.189	475	116	Yes	No

	Before	After
Picture		

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 60mΩ at RT.
- No fire and no explosion.

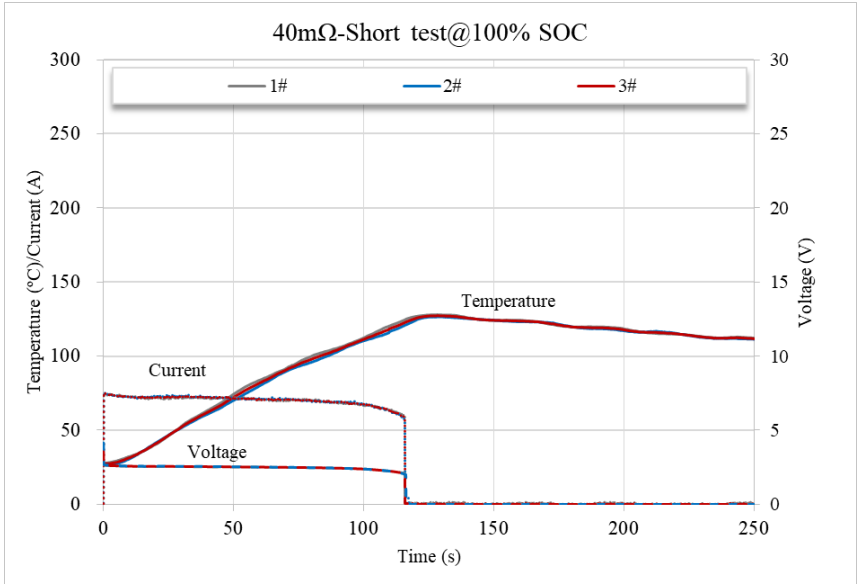


No.	Before		After			
	ACIR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (℃)	CID Open	Vent Open
1#	8.8	4.182	306	130	Yes	No
2#	8.8	4.187	310	130	Yes	No
3#	8.9	4.185	310	130	Yes	No

	Before	After
Picture		

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 40mΩ at RT.
- No fire and no explosion.

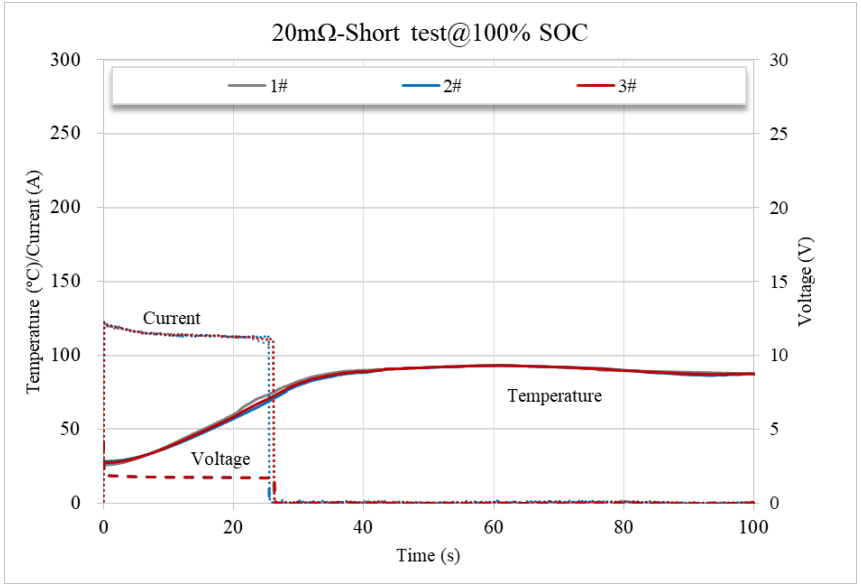


No.	Before		After			
	ACIR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (℃)	CID Open	Vent Open
1#	8.9	4.182	116	128	Yes	No
2#	9.0	4.184	116	127	Yes	No
3#	9.1	4.187	116	127	Yes	No

	Before	After
Picture		

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 20mΩ at RT.
- No fire and no explosion.

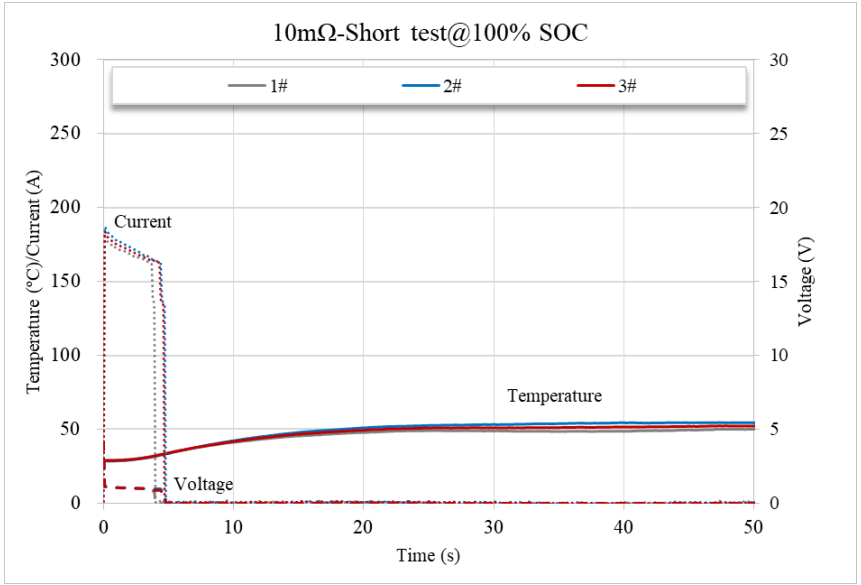


No.	Before		After			
	ACIR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (℃）	CID Open	Vent Open
1#	9.0	4.183	27	93	No	No
2#	8.8	4.189	26	93	No	No
3#	9.1	4.188	26	93	No	No

	Before	After
Picture		

3. Safety Performance -- Short Test

- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 10mΩ at RT.
- No fire and no explosion.

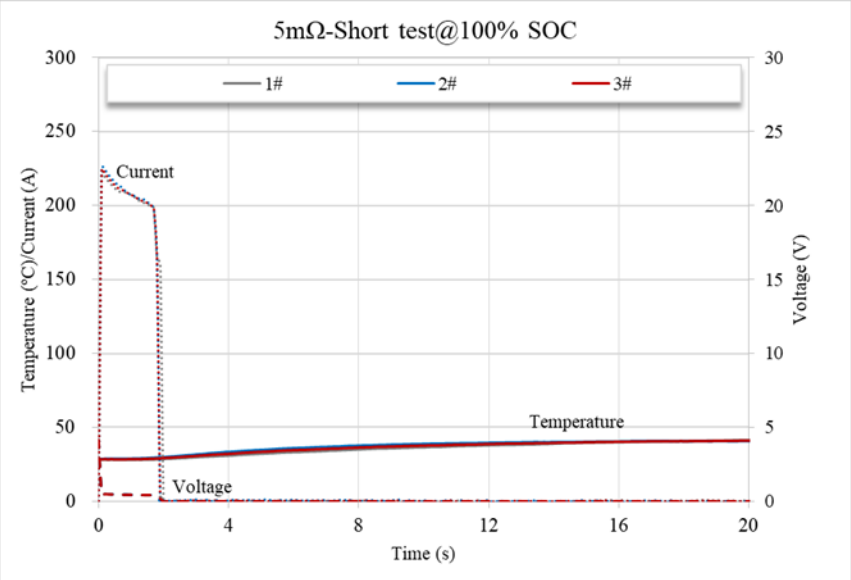


No.	Before		After			
	ACIR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (℃)	CID Open	Vent Open
1#	8.9	4.185	4	50	No	No
2#	8.7	4.183	5	55	No	No
3#	8.8	4.186	5	52	No	No

	Before	After
Picture		

3. Safety Performance -- Short Test

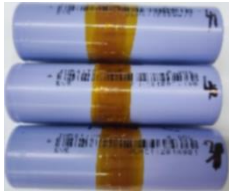
- Charge by CC=2A and CV=4.2V, 0.1A cut off, then short-circuited by connecting with a circuit of 5mΩ at RT.
- No fire and no explosion.



No.	Before		After			
	ACIR (mΩ)	Voltage (V)	Discharge Time (s)	Max. Temp. (℃）	CID Open	Vent Open
1#	8.8	4.186	2	43	No	No
2#	8.8	4.183	2	43	No	No
3#	8.9	4.185	2	43	No	No

	Before	After
Picture		

3. Safety Performance -- Other Safety Summary

Item	Overcharge		Force Discharge		Heating Test	
Test Standard	UN38.3		IEC62133		UL1642	
Picture	Before	After	Before	After	Before	After
						
Test Result	No fire, no explosion		No fire, no explosion		No fire, no explosion	

Item	Low Pressure Test		Drop Test		Vibration Test	
Test Standard	UN38.3		IEC62133		UN38.3	
Picture	Before	After	Before	After	Before	After
						
Test Result	< 10%OCV drop		No fire, no explosion		No fire, no explosion, no leakage; < 10%OCV drop	

4. Certification

UN38.3 by sea

UN38.3 by air

UL1642

IEC62133

ROHS

MSDS

REACH

THANK YOU